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ABSTRACT

The major systems development projects of the 1960's were concerned primarily with facility problems at the elementary and secondary levels. Rapidly increasing enrollments coupled with changes in both curriculum and in teaching methods created a demand for more flexible facilities that could be constructed rapidly and inexpensively. The success of systems procedures in dealing with the problems of time, cost, quality, and flexibility at the elementary and secondary school levels lead quite naturally to the extension of this approach to higher education. The four projects described in this issue are representative of the use of systems procedures to solve a variety of planning and design problems on community college, college, and university campuses. These projects have been deliberately selected to provide a wide geographic representation and include projects in New Jersey, Florida, and Oregon. The second part of this 2-part series on systems on the campus appears as EA 004 975. (Author)

BSIC/EFL NEWSLETTER

Vol. 4, No. 1 June 1972

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PHOTO AND DRAWING CREDITS

Harris Davis, cover, pp. 6 (top), 7
Jim England, p. 11 (top)
Geddes Brecher Qualls Cunningham, pp. 2, 4 (bottom), 5 (bottom)
Rowe-Paras, p. 9
Lawrence S. Williams, Inc., p. 5 (top)
BSIC/EFL, all others

COVER: Ramapo State College
Mahwah, New Jersey

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BUILDING SYSTEMS ON THE CAMPUS PART I

INTRODUCTION

The major systems development projects of the 1960's were concerned primarily with facility problems at the elementary and secondary levels. Rapidly increasing enrollments coupled with changes in both curriculum and teaching methods created a demand for more flexible facilities that could be constructed rapidly and inexpensively. Systems approaches to the design and construction of school facilities were developed in response to these demands.

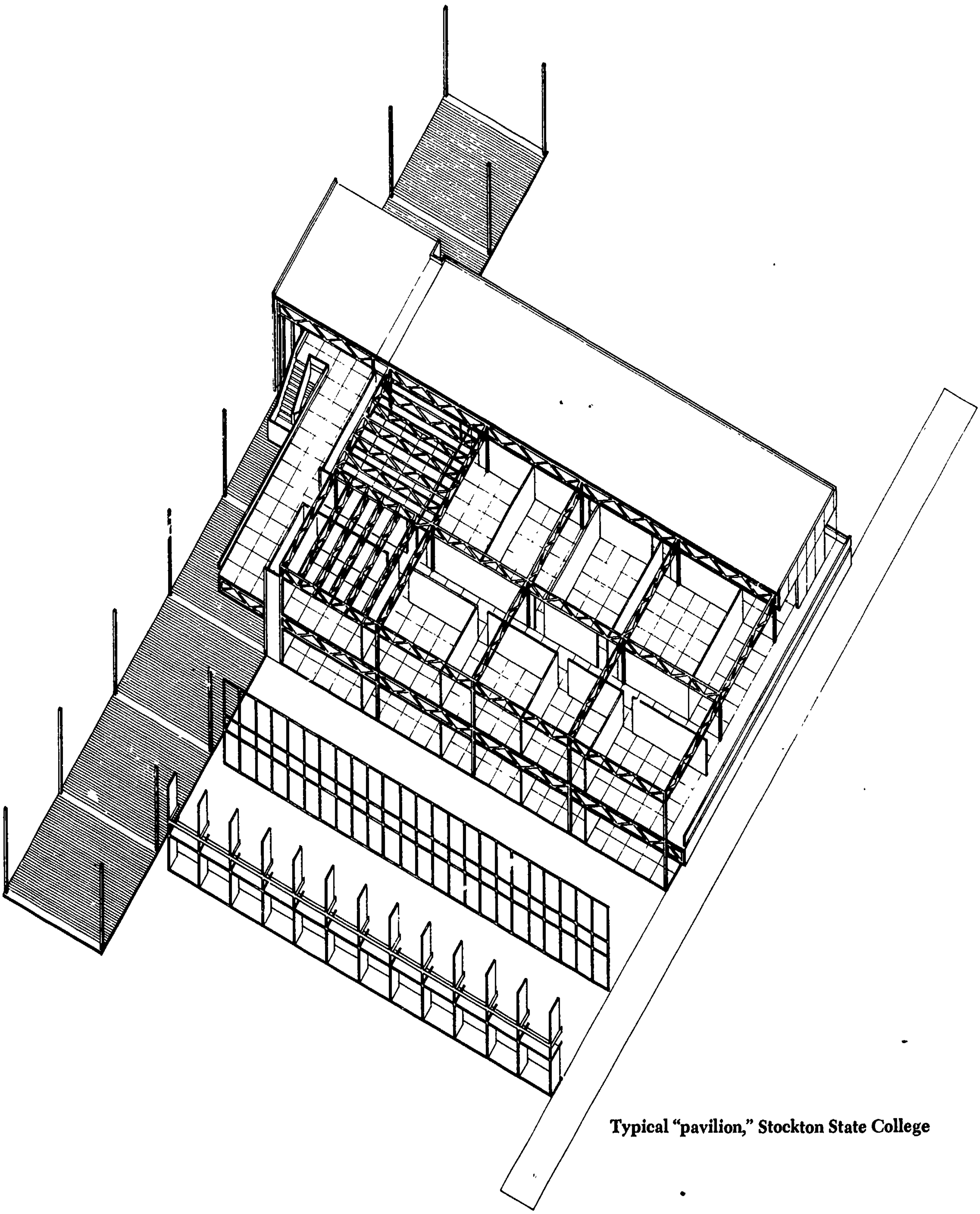
The success of systems procedures in dealing with the problems of time, cost, quality and flexibility at the elementary and secondary school levels lead quite naturally to the extension of this approach to higher education.

One of the first attempts to use systems procedures at the university level began in 1965 with the development of the University Residential Building System (URBS). This project developed a building system for student housing for use on the campuses of the University of California. The first URBS buildings were constructed on the San Diego campus and occupied in September of 1971. This program was followed in 1968 by a study of the application of systems procedures for academic buildings (ABS), which was undertaken jointly by the University of California and Indiana University. The ABS program has conducted detailed analytical studies aimed at producing a comprehensive system for all types of academic buildings. Its efforts have been specifically directed toward the development of a system of coordinated planning concepts, procedures and building components for science and engineering buildings. As a result of these studies, ABS has produced a series of three reports which include: *1/Environmental Study/Science and Engineering Buildings, 2/Cost Performance Study/Six Science and Engineering Buildings, 3/Information Manual/Procedures, Planning Concepts, Subsystems.* These reports are available from: Mr. Ronald Moor, Office of the Assistant Vice President for Physical Planning, University of California, Suite 207, University Hall, Berkeley, California, 94720.

While such studies as URBS and ABS have served to develop systems procedures and stimulate studies of new approaches to solving college and university facility problems, the main thrust has come from studies made by individual architectural firms who have made use of existing systems hardware and software in the solution of specific facility problems.

The projects described in this issue of the *Newsletter* are representative of the use of systems procedures to solve a variety of planning and design problems on community college, college and university campuses. They have been deliberately selected to provide a wide geographic representation and include projects in New Jersey, Florida and Oregon.

Part II of this series on systems on the campus will appear in the next issue of the *Newsletter*, and will detail the use of systems by the University of Alaska in its extensive Capital Improvement Program.



Typical "pavilion," Stockton State College

NEW JERSEY STATE COLLEGES

STOCKTON RAMAPO

In order to meet tight schedules without sacrifices in cost or performance, two architectural firms are applying a systems building approach to the phased construction of new units of the New Jersey State College system. This approach makes use of building systems for academic facilities, modular units for housing, and accelerated scheduling to meet the demands of cost, time, and function.

Background. In 1967, the voters of New Jersey authorized a bond issue to provide funds for the modernization and expansion of their state college system, including the development of two new campuses. Projections were prepared which indicated that the two institutions would reach their peak enrollments in the mid-1980's. At Ramapo State College, to be located in the state's northern region, 8000 FTE (full-time equivalent) students were anticipated by 1985. Stockton State College, to serve the Atlantic coastal region, would accommodate 7500 FTE students in academic year 1983–84.

Architects were selected in early 1970 and instructed to proceed as rapidly as possible with their work. The architects' responsibilities included masterplanning in addition to design and construction of the initial facilities. The architects were told that temporary structures could be used, if necessary, to accommodate 1000 FTE students by September 1971 on each campus.

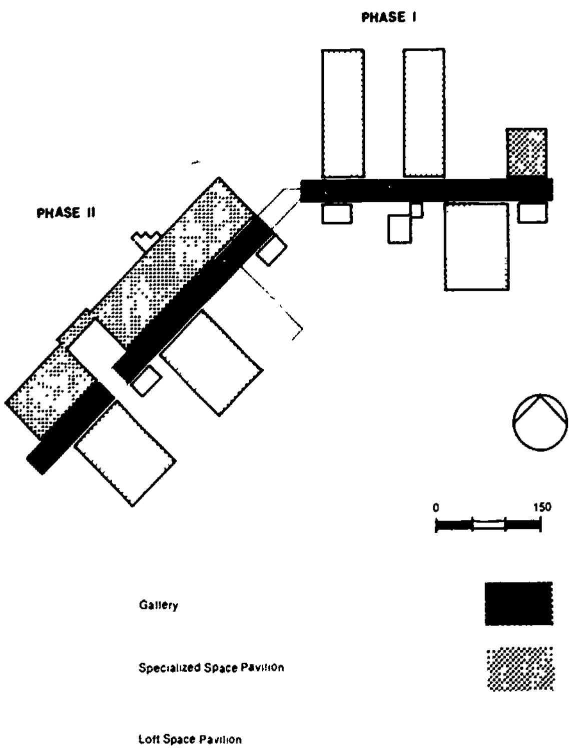
Systems Building Approach. As a result of their investigations into alternative means of providing facilities within the allocated time, the Stockton College architects, Geddes Brecher Qualls Cunningham, recommended to the college trustees that a building systems approach be used to meet the tight time schedule and performance requirements for academic buildings. With this approach, it appeared that permanent facilities could be provided on a schedule consistent with the college's space needs and temporary structures would not be required. The Stockton Trustees accepted their architects' recommendations. A few weeks later, a similar conclusion was reached by the Ramapo Trustees and their architects, Mahony and Zvosec/Kenneth DeMay.

Although the two campuses were not integrated into a formal systems program, several building subsystems—structure, HVC, lighting/ceiling, partitions, and carpeting—were early bid at the same time by the architects. The state hoped by bidding these subsystems simultaneously for both projects to obtain the benefits of a large volume program without some of its attendant organizational problems.

To provide on-campus housing for approximately twenty per cent of the Ramapo students, permanent facilities were designed to utilize factory produced modular housing units. Sterling Homex, Inc., units were selected and integrated into low-rise housing complexes. Conventional design and construction methods were employed to provide housing on the Stockton campus.

The Results. Facilities were occupied as scheduled and by December 1971, Phase I construction was completed on both sites. Considerably less than two years after the architects had received their commissions and site selection began, over 1000 students on each

Continued on page 13



STOCKTON STATE COLLEGE, PHASES I AND II

State of New Jersey, Pomona, New Jersey

Design Team:

Geddes, Brecher, Qualls, Cunningham, Princeton, New Jersey and Philadelphia, Pennsylvania, Architects

PHASE I: Jackson and Moreland Division, Boston, Massachusetts, Mechanical, Electrical and Structural Engineers

PHASE II: David Bloom, Inc., Philadelphia, Pennsylvania, Structural Engineers
Vinokur-Pace Engineering Services, Inc., Jenkintown, Pennsylvania, Mechanical and Electrical Engineers

Building Size:

PHASE I: 107,000 square feet to accommodate 1000 FTE students

PHASE II: 196,000 square feet to accommodate 1000 FTE students

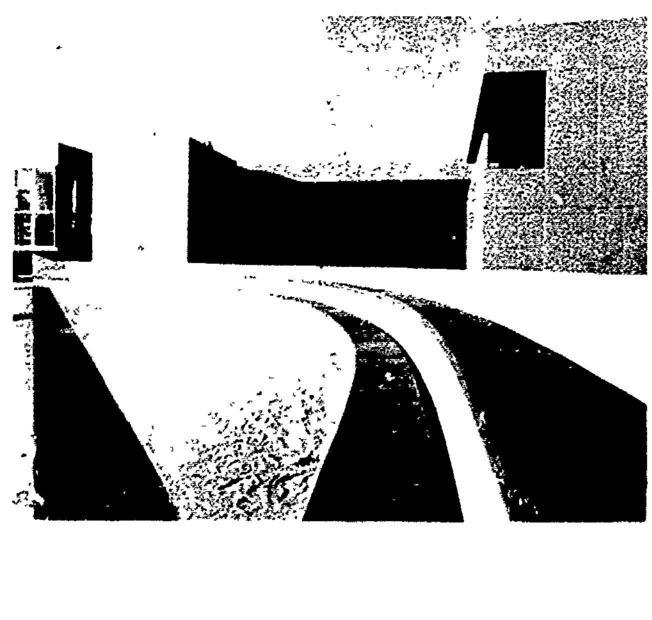
Subsystems, Phase I and II:

STRUCTURE: Romac MODULOC
HVC: ITT RTMZ (Phase I), Lennox DMS (Phase II)
LIGHTING/CEILING: Keene SPEC 60
PARTITIONS: Hauserman READY WALL
EXTERIOR WALL: Kawneer/Bettinger
CARPET: Welco
REINFORCED CONCRETE: Phase II only

Costs and Scheduling:

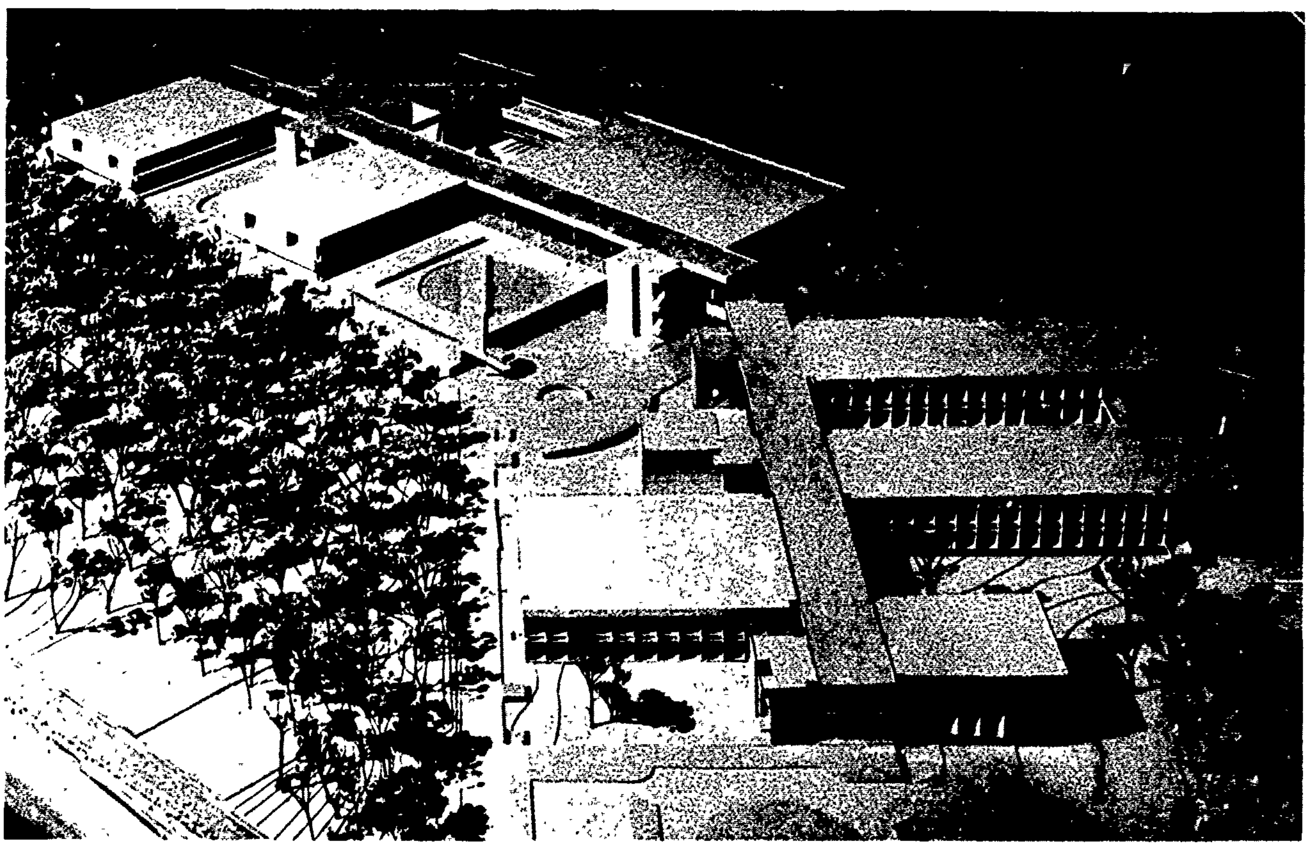
	SUBSYSTEMS TOTAL	COST SQ.FT.	BUILDING TOTAL	COST SQ.FT.	CONSTRUCTION COST	DESIGN BEGUN	CONSTRUCTION BEGUN	CONSTRUCTION COMP.
PHASE I	$1,846,589	$17.26	$3,948,558	$36.90	$5,048,558[a]	5/70	12/70	12/71
PHASE II	$3,323,895	$16.95	$7,089,170	$36.15	$7,089,170[b]	3/71	4/72	1/73 6/73

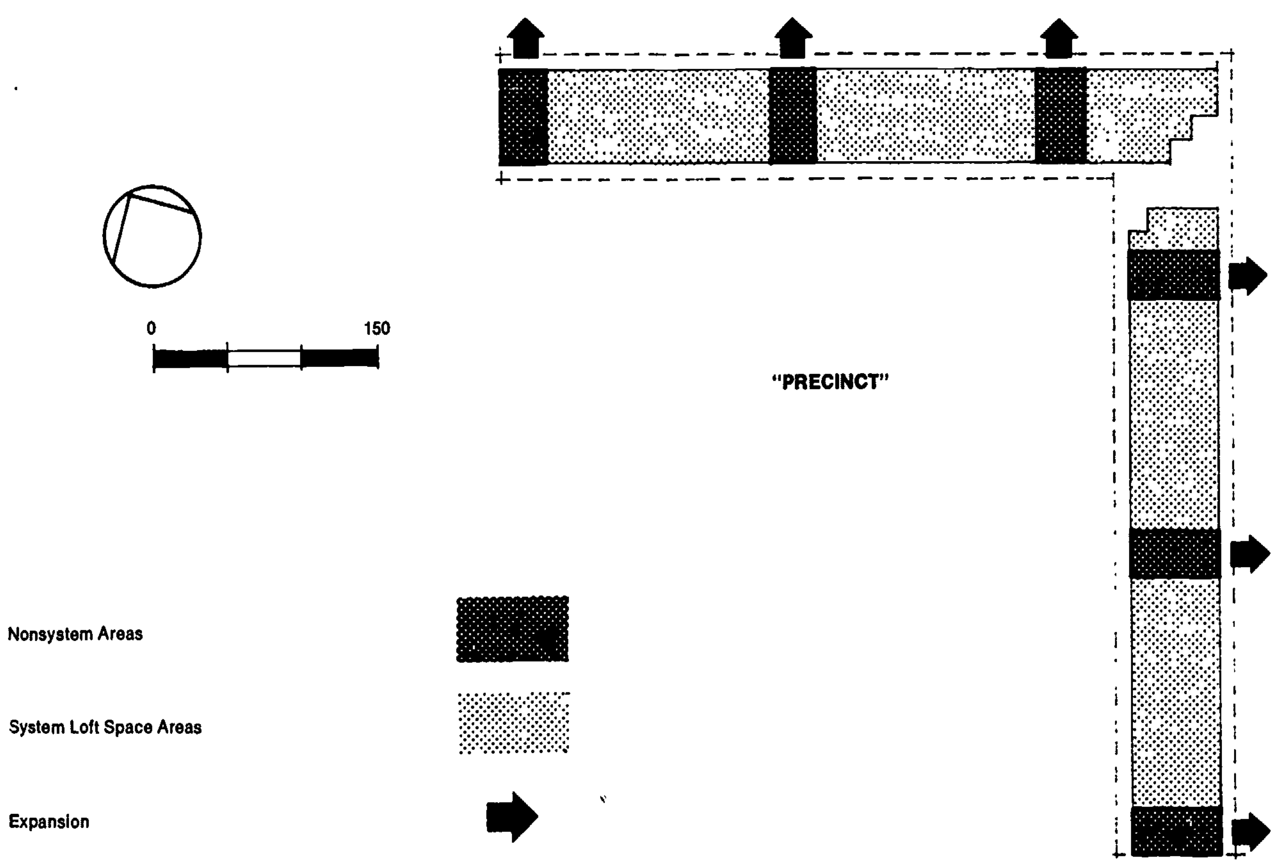
NOTES: a. Includes all primary site utilities, roads and parking.
b. Includes all contiguous site work and utility connections.



The masterplan of Stockton State College calls for a linear configuration for the academic complex with a continuous enclosed gallery linking it together. Ranged along this gallery are two types of "pavilions"—one providing space for general purpose use and the other for special purposes, such as auditoria and athletic facilities. These pavilions are placed on alternating sides of the gallery, allowing at least one side of the gallery to be opened up to views and outdoor plazas.

Using a space planning module of 30′ by 30′ based upon an optimum structural bay size, the architects have developed two basic general purpose pavilions—one measuring 60′ by 180′ on the ground and the other 90′ by 120′. Each pavilion contains two 10,800 square foot loft floors designed for subdivision by demountable partitions into classrooms and offices.

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150
"PRECINCT"
Nonsystem Areas
System Loft Space Areas
Expansion

RAMAPO STATE COLLEGE, PHASES I AND II

State of New Jersey, Bergen County, New Jersey

Design Team:

Mahony & Zvosec· Kenneth DeMay, Princeton, New Jersey, Architects

Kallen & Lemelson, New York, New York, Mechanical Engineers

Wiener & Thaler, Newark, New Jersey, Structural Engineers

Building Size:

PHASE I: 146,740 square feet to accommodate 1000 students

PHASE II: 23,750 square feet in systems portion

Subsystems, Phases I and II:

STRUCTURE: Romac MODULCC[a]

HVC: Trane with central plant

LIGHTING/CEILING: Keene SPEC 60

PARTITIONS: Hauserman READY WALL

EXTERIOR WALL: Cupples SERIES 4000

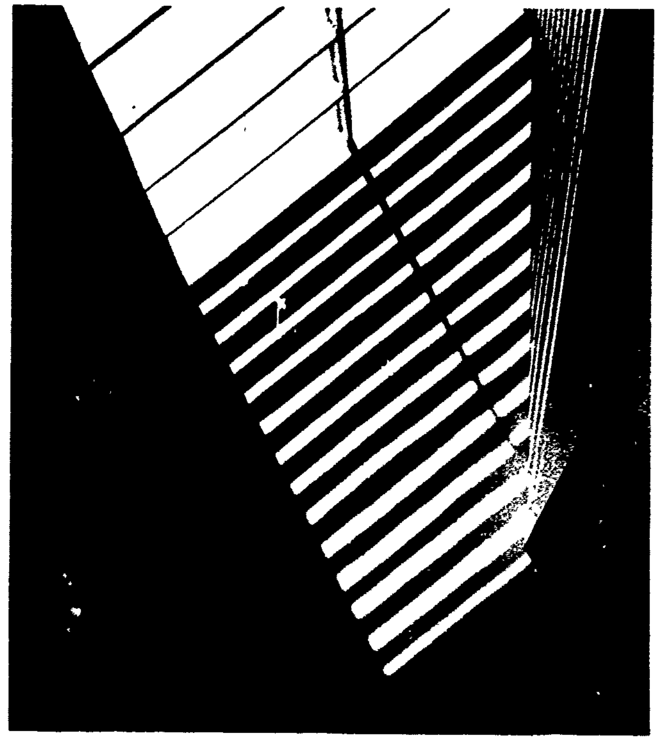
CARPET: Welco

FOUNDATIONS:

SWITCHGEAR:

Construction Manager: MDC Systems, Cherry Hill, New Jersey

Costs and Scheduling:

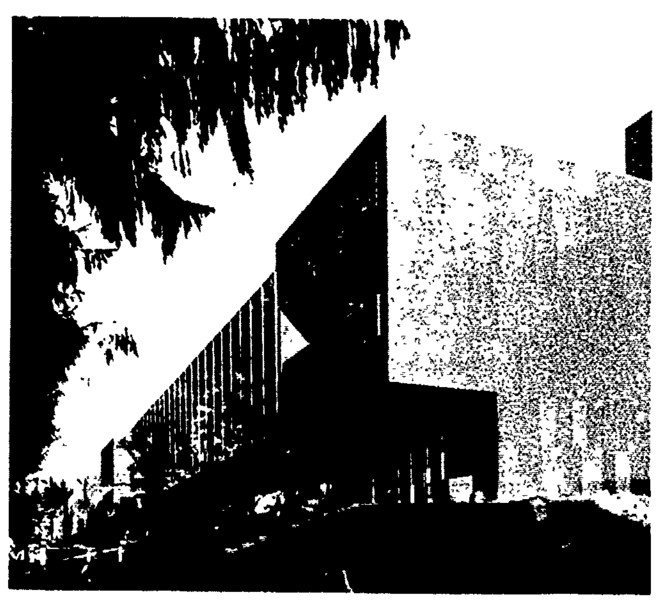


	SUBSYSTEMS COST TOTAL	SQ.FT.	BUILDING COST TOTAL	SQ.FT.	CONSTRUCTION COST	DESIGN BEGUN	CONSTRUCTION BEGUN	COMP.
PHASE I	$1,822,000	$12.42	$6,059,000	$36.90	$9,538,000	3/70	11/70	9/71
PHASE II	$ 98,876[a]	$ 4.16	$1,130,000	$47.55		12/70	10/71	10/72

NOTE: a. Phase II, Student Center: structure only in building system.

The academic complex at Ramapo State College is L-shaped, focusing on a "sacred precinct" composed of a mansion and gardens developed during the site's previous use as a private estate. In constructing the facilities, the architects dictated that a tolerance zone be left around the new construction for access, storage, etc., and that the gardens be unmolested.

The main Phase I building consists of two types of space: that constructed with the building system, providing adaptable loft space for general classrooms and offices; and nonsystems space in the service and circulation towers. The systems areas will be used as "surge facilities" to house college programs until specialized departmental facilities can be provided. Each of the nonsystem towers, in addition to service and circulation, forms a node at which a departmental or other building can be added to the complex. In Phase II, two of these buildings are being added.



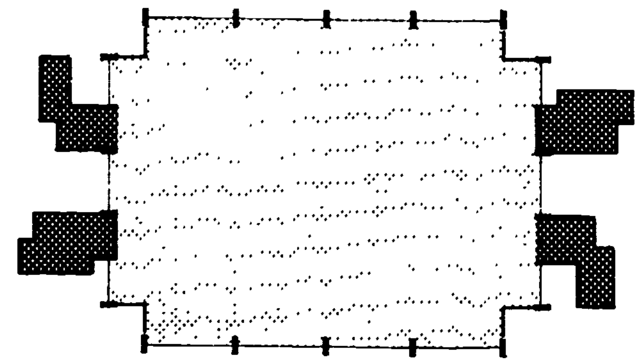
THE FIRST FLORIDA UNIVERSITY BUILDING SYSTEM

After evaluating systems projects located throughout the nation and the state's own Schoolhouse Systems Program (SSP), the State of Florida Department of General Services and the State University Board of Regents have determined that building systems, new methods of bidding, and construction management procedures should be applied to the State University Building Program.

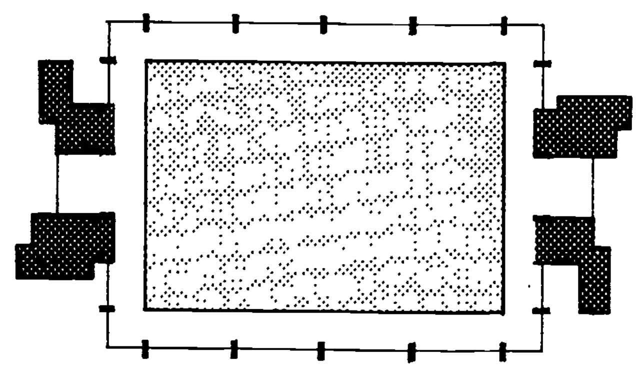
To this end, the state has commissioned Rowe-Paras and Associates, architects, to undertake a program with two concurrent aspects. The first is to research other systems programs and their potential applications to state university construction. Simultaneous with this research, the second aspect is to develop and implement a systems approach in the construction of a prototype project—the Humanities and Fine Arts Building—including the organization and application of the First Florida University Building System.

The objectives of the program include first cost reduction, but are primarily concerned with long-term goals of facility adaptability and lower life costs. In meeting program objectives, the architects feel that a systems approach offers these advantages:

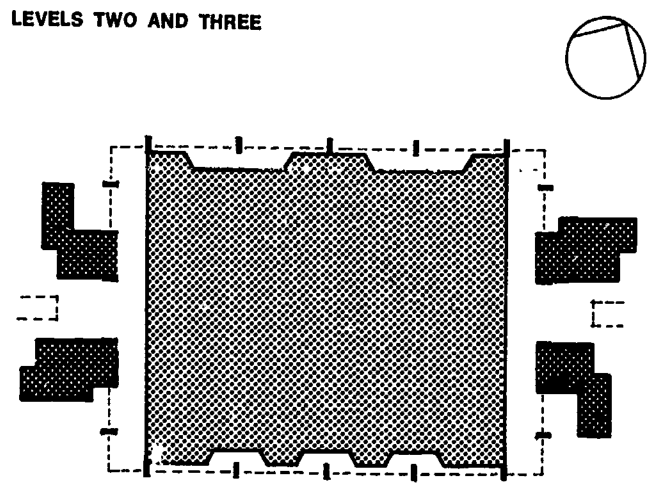
1. More accurate prediction of building construction costs;
2. Better administrative management with systems tools allowing faster and more effective space planning and budgeting for new facilities;
3. Substantially lower building life costs, due to faster, more economical, and less disruptive alterations;
4. Reduction in design and construction time because basic design can be completed and subsystem construction begun before academic programs are fully developed;
5. Reduction in total project time and cost through design and management tools inherent in the systems approach;
6. Decision-making on budget and resource allocation by the owner and design professionals based on definitely established cost versus performance data.



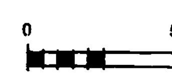
LEVELS FOUR AND FIVE



LEVELS TWO AND THREE



LEVEL ONE



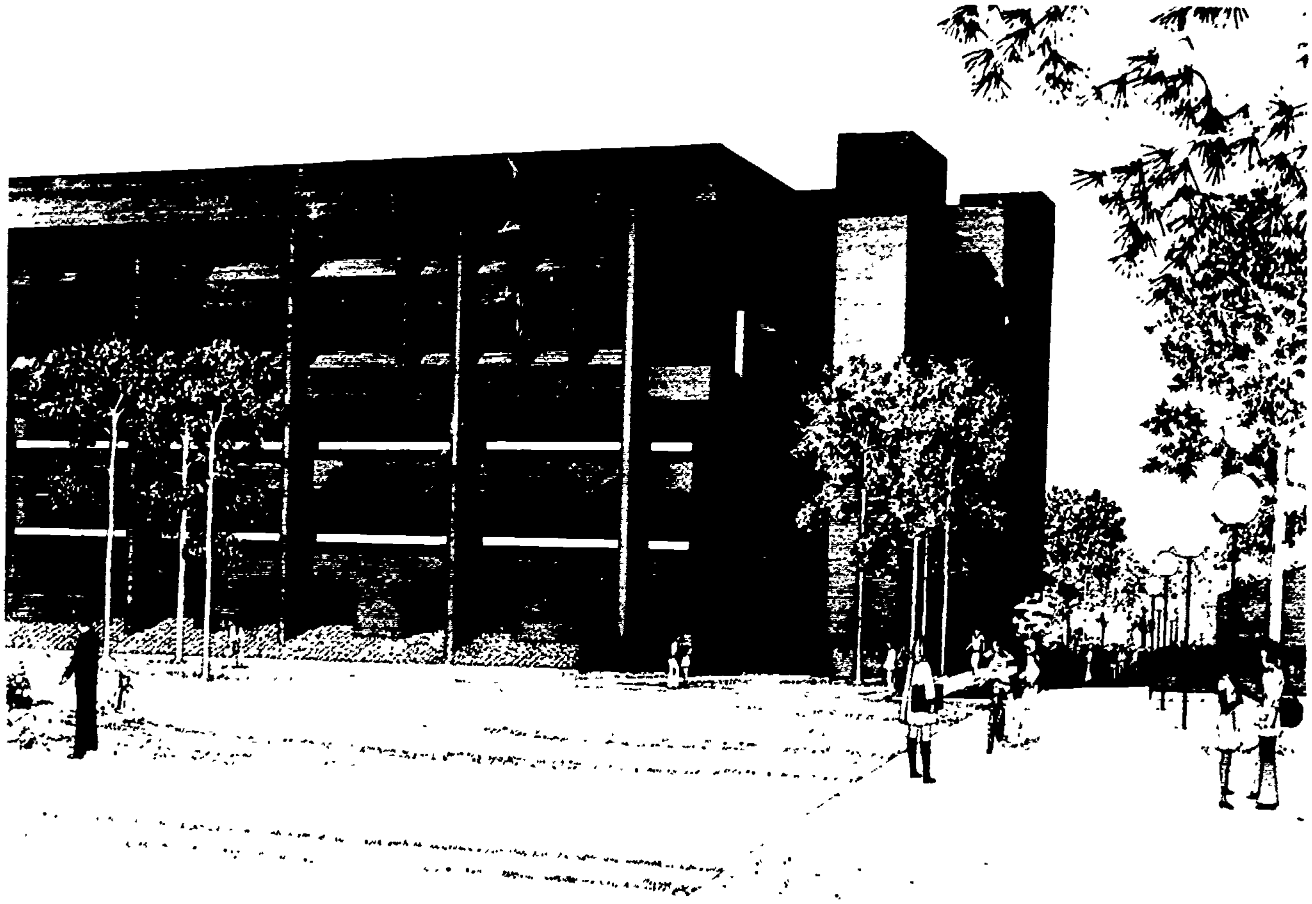
Adaptable Loft Space

Permanent Space

Nonsystem Areas

The Humanities and Fine Arts Building

The Humanities and Fine Arts Building, the first application of the building system, contains two types of building elements—permanent and adaptable. Permanent elements form the fixed framework of the building and usually will remain unaltered during the life of the building. Adaptable elements are items that may be



relocated or replaced as time passes. The initial configuration of adaptable elements could be considered simply the first building alteration.

Corresponding to these two types of elements, the building is divided into two types of space—permanent and adaptable. The major permanent space is the music facilities located on the first floor. Each of the upper four levels contains over 16,000 square feet of adaptable space. Permanent features such as elevators, stairs, and mechanical and toilet rooms are located in service towers outside but contiguous to the adaptable areas.

HUMANITIES AND FINE ARTS BUILDING

Florida Technological University
Orlando, Florida

Architects:
Rowe-Paras and Associates, Architects, Inc.,
Tampa, Florida

Project Size:
81,200 square feet on five floors to accommodate 1300 faculty and students

Subsystems:
STRUCTURE: Romac Steel Co. (MODULOC)
HVC: Poole and Kent Co.
LIGHTING/CEILING: Acousti-Engineering Co. (Armstrong C-60)
PARTITIONS: Acousti-Engineering Co. (Hauserman)
CARPET: Carpet Systems I c. (Bigelow-Sanford)
VERTICAL TRANSPORTATION: Miami Elevator Co. (Dover)
ROOFING: Rebidding

Project Costs:
SUBSYSTEMS: $837,358, or $10.31/square foot
BUILDING COST: estimated $1,936,623, or $23.85/square foot

Project Schedule:
DESIGN BEGUN: May 1971
CONSTRUCTION BEGUN: estimate Summer 1972
CONSTRUCTION COMPLETED: estimate Summer 1973

CHEMEKETA COMMUNITY COLLEGE

In developing the first phase of their masterplan for the Chemeketa Community College Campus, a General Classroom Building, the architects and owner decided to apply a building systems approach. At the same time, it was decided to attempt to cut an entire year from the Phase I schedule and have the new facilities ready for use for the academic year 1972–1973.

Four months later, in November 1971, twenty-four local and regional suppliers submitted proposals for the building system, many of which had been prepared with the assistance of national product manufacturers. Seven of these bidders were selected as subsystems suppliers on the basis of the lowest total system cost. A general contractor was chosen competitively in February 1972, and began on-site construction in March.

By making use of the building system's characteristics, the architects have designed the General Classroom Building for flexibility. Each of the building's two floors is a loft space of approximately 30,000 square feet which can be divided into functional spaces with demountable partitions. Vertical service chases and circulation are confined to the four nonsystem corner towers which also provide lateral force resistance required by the building code.

CHEMEKETA COMMUNITY COLLEGE, PHASE I

Chemeketa Community College District, Salem, Oregon

Design Team:

Car[illegible] and Sherman, Architects and Planners, Salem, Oregon

Daniel, Mann, Johnson and Mendenhall, Portland, Oregon, Consulting Architects

Building Size: 58,600 square feet

Subsystems:

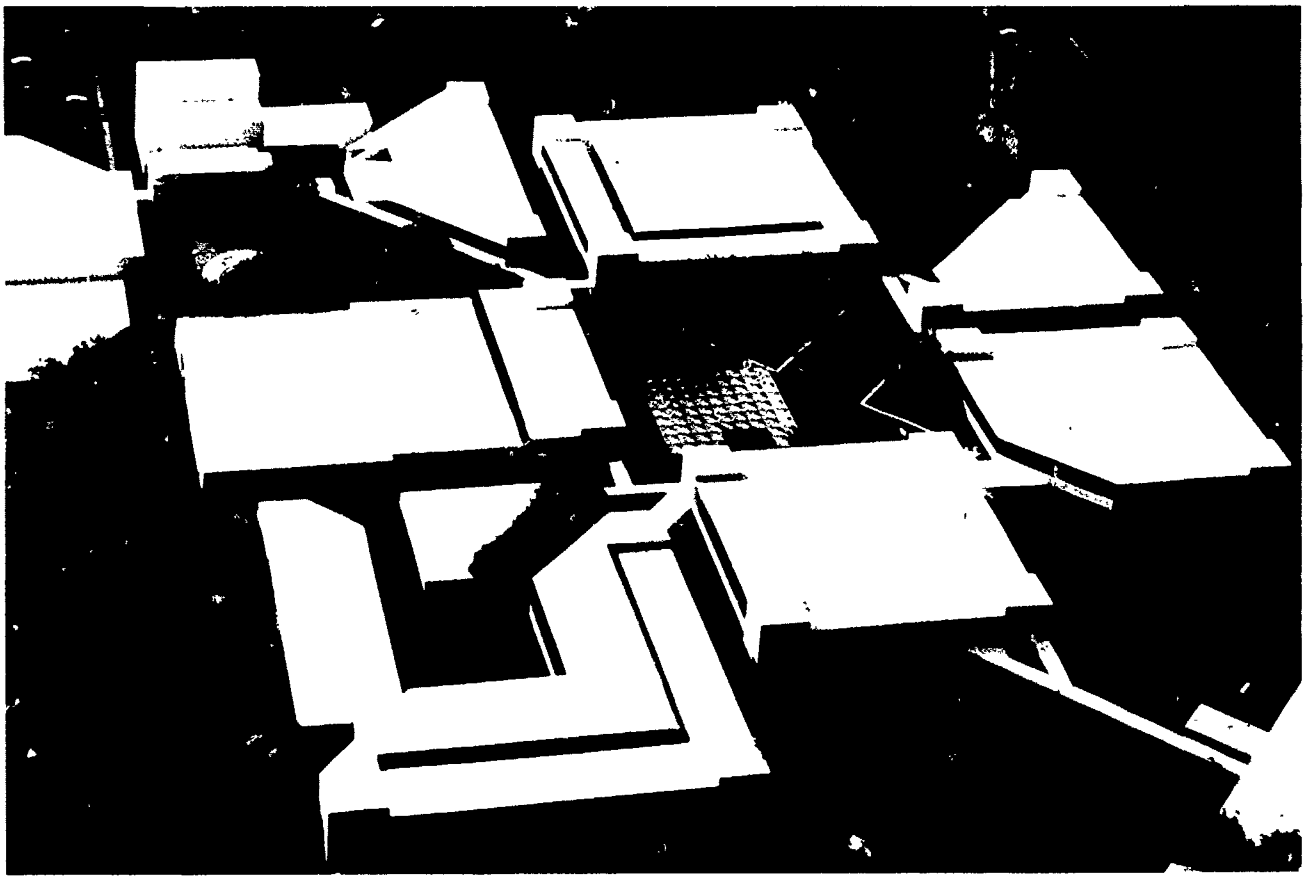
STRUCTURE: Macomber V-LOK
HVC: Lennox DMS
LIGHTING/CEILING: Armstrong C-60
PARTITIONS: Kaiser KW-500
CARPET: Commercial Carpet Co.
ROOFING: Johns-Manville
FIRE SPRINKLERS: Sentry Automatic

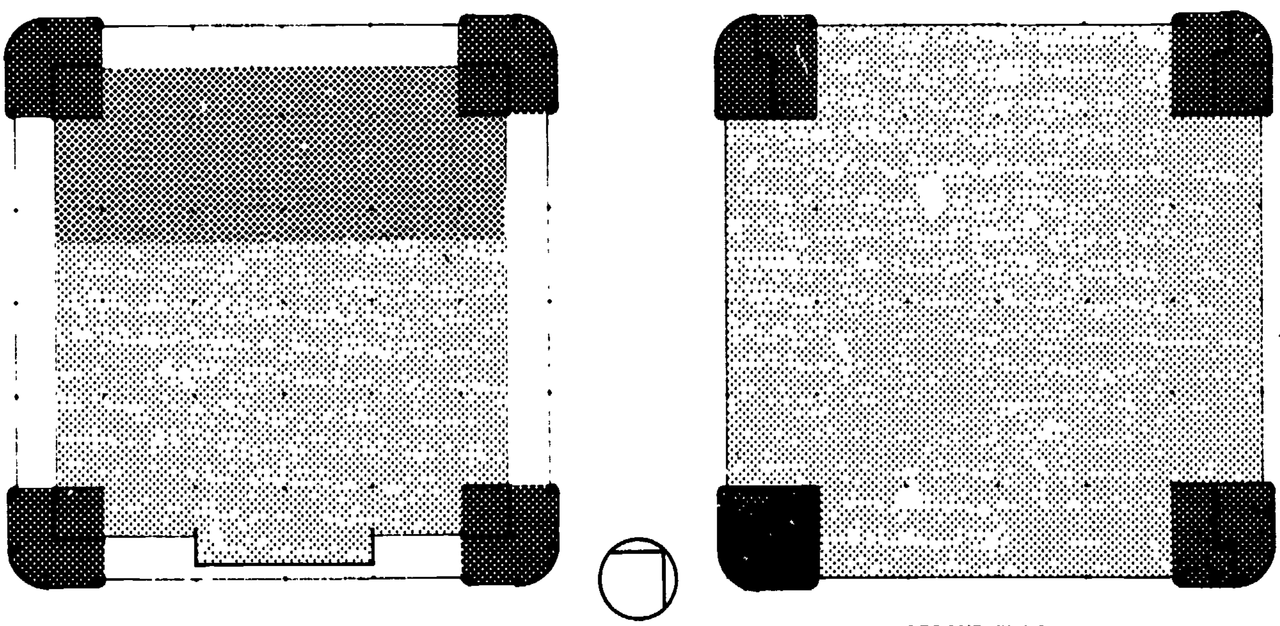
Project Costs:

SUBSYSTEMS: $590,339, or $10.08/square foot
BUILDING COST: $1,165,300, or $19.89/square foot
CONSTRUCTION COST: $1,303,300

Project Schedule:

DESIGN BEGUN: July 1971
CONSTRUCTION BEGUN: March 1972
CONSTRUCTION COMPLETED: estimate September 1972





FIRST FLOOR

SECOND FLOOR

0 60

Loft-type Space

Permanent Space

Nonsystem Areas

BSIC ACTIVITIES

SYSTEMS BUILDINGS DATA BANK

As announced in the October 1, 1971 issue of the *Newsletter*, BSIC has established a data bank on facilities constructed with building systems. Included in the bank are data on owners, architects, subsystems used and their costs, building and construction costs, project sched[illegible] and [illegible]y dates in project development. The basic p[illegible]ing for computer assisted storage and retrieval of the data has been completed.

Approximately one hundred educational facilities constructed with building systems have been entered in the bank. Included in this number are facilities constructed from 1965 to the present, and a number still under construction. All levels of facility are represented, including primary and secondary schools, higher education facilities and a variety of specialized facilities. Both the United States and Canada are represented.

Future plans for the data bank include continuing development of basic and takeoff programming in response to user needs, the addition of more facilities and the inclusion of other building types in the bank. Addition of nonsystems facilities to provide comparisons and controls is also envisioned. BSIC is seeking to collaborate with other organizations engaged in similar research and data collection.

BSIC is prepared to service requests for information from the bank. Such information requests should be stated as clearly as possible and should include a statement of the ultimate use of data provided from the bank. As many such requests as possible will be honored.

The content of the bank is dependent upon the voluntary contribution of project data by architects or owners. If you wish to enter a project in the bank, send BSIC the following information:

1. Name and location of the project;
2. Architect or design firm involved and its address;
3. Contact for further information.

BSIC will respond by mailing data sheets to the listed contact for completion.

MCS UPDATE

In recent discussions with architects and manufacturers, BSIC has discovered that the typical means of announcing subsystem bid dates is to contact or send an announcement to the manufacturers listed in *BSIC Special Report Number One: Manufacturers' Compatibility Study (MCS)*. Because BSIC is not in a position to revise MCS more often than annually, we have decided to use the *Newsletter* to update the address listings. As a regular feature, new products and manufacturers and changes in addresses and contacts will be published in the *Newsletter*. It is incumbent upon manufacturers to notify BSIC of any such changes.

Specific items of product performance or revisions of the compatibility matrices cannot be included in the *Newsletter* because of space and time limitations. This type of data will be updated in the revisions of MCS. Manufacturers should notify BSIC of such updatings as the revision schedule for MCS is dependent upon the number of anticipated changes in current information.

If manufacturers wish to correct the information contained in the September 1971 edition of MCS, they should notify BSIC/EFL, 3000 Sand Hill Road, Menlo Park, California, 94025.

Current revisions are:

A. *Additions.*

1. Add to Manufacturers of HVC Subsystems, page 11:
   MANUFACTURER: H. K. Porter Company, Inc.
   Electrical Division
   7100 South Grand Avenue
   St. Louis, Missouri 63111
   CONTACT: R. J. Kraus
   Sales Manager
   (314) 832-5000

2. Add to Manufacturers of Demountable and Portable Partition Subsystems, page 21:
   PRODUCT: *Space Styler*
   CONTACT: David Petrovec
   (516) 239-1000
   MANUFACTURER: Rockaway Metal Products Corp.
   175 Roger Avenue
   Inwood, Long Island,
   New York 11696

3. Add to Firms Providing Partial Building Systems, page 23:
   SYSTEM: Interior Systems
   CONTACT: Dean Jackson
   Manager, Special Contract Sales
   (414) 276-9200
   ADDRESS: Johnson Service Company
   507 E. Michigan
   Milwaukee, Wisconsin 53201

4. Add to Firms Providing Partial Building Systems, page 23:
   SYSTEM: Erector System
   CONTACT: Harold Lindhal
   (415) 567-4737
   ADDRESS: Lindhal, Kusmierski, Ipsen & Ostrow
   2321 Pine Street
   San Francisco, California 94115

5. Add to Manufacturers of Electric/Electronic Distribution Subsystem, page 24:

MANUFACTURER: Miroflector Co., Inc.
40 Bayview Avenue
Inwood, L. I., New York
11696

CONTACT: Milton Liberman, President
(516) 371-1111

B. *Corrections.*

1. New address and contact for Structural Manufacturer, page 7:

MANUFACTURER: Inland-Ryerson Construction Products Co.
2875 Prune Avenue
Fremont, California 94538

CONTACT: Doug Nesbitt
(415) 656-4900

2. New address and contact for HVC Manufacturer, page 9:

MANUFACTURER: Lennox Industries Inc.
200 South 12th Street
Marshalltown, Iowa 50158

CONTACT: Ted Gilles or Warren B. Johnson
Environmental Systems Group
(515) 754-4214

BSIC PUBLICATIONS

BSIC has available a number of reports and studies covering systems building of educational facilities. Single and multiple copies are available at the price listed. Subscription to the BSIC *Newsletter* is available free upon request.

BSIC Newsletter No. 1, Spring 1969 ($1.00)
BSIC Newsletter Vol. 3, No. 4, December 1971 (No Charge)
BSIC Special Report No. 1: Manufacturers' Compatibility Study, September 1971 ($1.00)
BSIC Special Report No. 2: Listing of Schools Constructed with a Building System, July 22, 1970 ($0.50)
BSIC Special Report No. 3: Building Systems Planning Manual, August 1971 ($1.00)
BSIC Research Report No. 3: A History and Evaluation of the SCSD Project, 1961–1967, 1971 ($5.00)
List of Sources of Information about EFL Supported Systems Building Projects (No Charge)

Checks should be made payable in U.S. funds to BSIC/EFL. California residents should add 5 per cent sales tax. Price includes handling and postage at special fourth class book rate. For first class mail, please include 50 cents per publication ordered. For *BSIC Research Report No. 3: A History and Evaluation of the SCSD Project, 1961–1967,* add $2.00 for first class mailing.

RECENT PUBLICATIONS AVAILABLE FROM EFL

Found Spaces and Equipment for Children's Centers (1972)

High School: The Process and the Place (1971)

Places and Things for Experimental Schools (1972)

Schools: More Space/Less Money (1971)

Copies of these publications are available at $2.00 from EFL, 477 Madison Avenue, New York, N.Y. 10022

New Jersey State Colleges

Continued from page 3

campus were accommodated in high-quality permanent academic facilities. Specific facility construction times on the campuses ranged from nine to twelve months.

In terms of value to the owner, the architects of Ramapo State College believe that their facility is "a highly sophisticated building at a moderately sophisticated price." They feel that Ramapo Phase I at $41 per square foot compares favorably in function, quality, and durability with conventionally built college buildings that cost from $55 to $65 per square foot.

The Phase I building costs at Stockton State College totaled $36.90 per gross square foot and are providing the using agency with teaching and activity spaces comparable in quality to conventionally constructed spaces, while still providing the rearrangement flexibility inherent in the building systems concept. This flexibility capability was a principal program requirement for Stockton State College.

Phase II and Beyond. Phase II construction, scheduled for completion during academic year 1972–1973 will increase each campus' capacity to 2000 FTE students. In Phase II, the architects for Ramapo used building systems for some portions of the work, while other specialized facilities at Ramapo used nonsystem construction. Phase II of Stockton State College used building systems throughout and employed prebid procedures for six component subsystems. The subsystems in Phase II were bid separately by the two firms.

Following an overall program which calls for annual growth increments of approximately 1000 FTE students on each campus, the architects are preparing designs for the Phase III construction program. Bids on building subsystems contracts will be taken during the summer of 1972 with completion of these facilities scheduled for the first half of 1973.